



## Using a Market Basket to Explore Regional Food Systems

A summary of “Using a Market Basket to Explore Regional Food Systems” by Kate Clancy<sup>a</sup>, Alessandro Bonanno<sup>b</sup>, Patrick Canning<sup>c</sup>, Rebecca Cleary<sup>b</sup>, Zach Conrad<sup>d</sup>, David Fleisher<sup>e</sup>, Miguel Gómez<sup>f</sup>, Timothy Griffin<sup>d</sup>, Ryan Lee<sup>g</sup>, Daniel Kane<sup>h</sup>, Anne Palmer<sup>g</sup>, Kristen Park<sup>f</sup>, Christian Peters<sup>d</sup>, Nicole Tichenor<sup>i</sup>. Published in *Journal of Agriculture, Food Systems, and Community Development*, December 21, 2017.

The Enhancing Food Security in the Northeast (EFSNE) project was a unique interdisciplinary, multi-institutional, complex systems project addressing many different components of food security in the Northeast. More specifically, EFSNE addressed some of the socioeconomic and biophysical constraints to regional food system expansion. EFSNE’s long-term goal is to assess whether greater reliance on regionally produced food can improve food access for low-income communities as well as benefit farmers, food supply chain actors, and others in the food system. Our primary objective was to increase our understanding of the mechanisms necessary to more broadly enhance food security via mainstream markets in a region.

Among the many research devices employed by three project research teams (Production, Distribution, and Consumption) the market basket was central to providing a cohesive framework for the entire project.

Market baskets are frequently used instruments in food environment and cost studies. In this context, a market basket is defined as “a list of foods (often many items long) that represent an adequate total diet which may include both unhealthy and healthy foods frequently consumed by the population” (McKinnon, Reedy, Morrissette, Lytle, & Yaroch, 2009). In EFSNE

the market basket tool allowed the teams to organize their work around the same foods. It is the single thread that ties together the various research efforts of the entire project. Researchers were able to aggregate and interconnect data from multiple analyses conducted within multiple disciplines. The market basket framework enabled a rich story about a specific set of foods, their supply chains, and the future opportunities to enhance their production and distribution in the region.

Several of the project’s research questions were served by utilizing a market basket: (1) what regional production looks like at the present time and what the capacity is for producing more of these particular foods in the future; (2) which regionally produced foods are now found in stores in low-income areas; (3) what do the supply chains look like for these foods to identify where the leverage points might be along the chain to increase the amounts going into supermarkets in low-income areas; and (4), who are the purchasers and what are the purchasing patterns of these foods in the stores which we studied.

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## Research activities using the market basket

One of the first collaborative exercises of team members was choosing the eight items that the market basket would comprise. Selection was based on these considerations:

1. Whether the Northeast was a major producer of the food
2. Which foods were more likely to be produced and processed in the Northeast or outside the region
3. Whether the food was a staple component of most diets in the low-income areas in which we worked (all except bread met this criterion)
4. Representation from all the basic food groups
5. Whether the food existed in recommended or less recommended forms (healthier and less healthy)
6. A mix of fresh and processed foods, including frozen and canned
7. How many items the project teams could reasonably study; we chose eight.

The following food items comprised the EFSNE market basket:

<ul style="list-style-type: none"> <li>• Apples</li> <li>• Cabbage</li> <li>• Potatoes</li> <li>• Frozen broccoli               <ul style="list-style-type: none"> <li>» in sauce</li> <li>» without sauce</li> </ul> </li> <li>• Canned peaches               <ul style="list-style-type: none"> <li>» in syrup</li> <li>» in juice</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Bread               <ul style="list-style-type: none"> <li>» white</li> <li>» whole wheat</li> </ul> </li> <li>• Milk               <ul style="list-style-type: none"> <li>» whole</li> <li>» low-fat</li> </ul> </li> <li>• Ground beef               <ul style="list-style-type: none"> <li>» regular</li> <li>» lean</li> </ul> </li> </ul>
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Focusing on these foods, the three research teams employed various research methods. The Production Team used over 15 USDA data sets to produce analyses of production and consumption, land requirements, and population food needs, resulting in measures of Regional Self Reliance (RSR) for a total of 89 foods including market basket items. They also calculated the footprint of six of the foods. A food-

<sup>1</sup> Regional self-reliance is the net balance between the production of a commodity and the regional availability of the food. See “How self-reliant is the Northeast food system?” EFSNE Research Brief No. 1, available online at <https://goo.gl/JhBPTU>.

print is the area of cropland required to produce each food item based on US per capita consumption of market basket foods and on the crop and livestock productivity per acre in the Northeast region (Peters, 2017).

The Distribution Team developed case studies of 11 grocery stores in project locations to assess the stores’ procurement of market basket items. Each case included a supply chain analysis of two of the market basket foods that looked at product flows, volume, prices, and margins. The Consumption Team undertook consumer intercept surveys to record shopping habits, market basket purchases, and participation in national nutrition programs. They conducted store inventories of market basket items to record prices and sources of the foods. They also analyzed household purchasing data from the ERS-IRI Consumer Network Panel to understand consumer purchases across different demographics. They calculated the percentage of low-income and non-low income consumers who purchased six of the eight market basket items over one year, as well as average expenditures and average quantities purchased per household member and the purchases across different types of stores.

Agricultural scientists are increasingly turning to modeling to explore multiple facets of agricultural systems for different purposes. For example, they predict future production of crops under different environmental conditions. EFSNE researchers developed models that explored scenarios for six of the market basket foods, providing critical information as to the leverage points for increasing production capacity and food security in the region. For example:

- Production Team members measured the potential production capacity of the region for potatoes under different climate change scenarios using geospatial crop modeling. This work will help future efforts to assess the regional production capacity for other crops.
- The Distribution Team developed optimization models of dairy, broccoli and cabbage in order to assess the economic and environmental impacts of increased regionalization (i.e. emphasis on region-scale supply chain components) of Northeast food supply chains.

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## Findings

Researchers determined which of the market basket foods are produced where in the Northeast region, as well as which are found in the stores in low-income areas. In terms of RSR, we verified that some foods are inherently more regional (apples, cabbage, milk and potatoes) than other basket items. We also demonstrated that there is significant economic value added at the regional level from downstream supply chain members. More research of this type is needed on a variety of foods to identify those that could be produced and distributed in larger amounts in the region, as well as the necessary resources and policies.

Primary and secondary analyses of purchases help researchers to better understand urban and rural community food security issues. For example, a higher share of low-income than non-low-income households bought more market basket items, and low-income purchasers paid on average lower prices for market basket foods except for lean beef.

A research objective was to identify leverage points in supply chains for increasing the amounts of market basket foods entering supermarkets in low-income areas. We found that wholesalers wield a lot of control in what makes it to the shelves, but retailers can play a critical role in expanding markets for regionally produced and processed foods. Several storeowners and managers who participated in the project said that they were willing to search out local and regional products for their stores; as independent retailers, they have the autonomy to do so.

Production models generated by the project researchers offer some optimistic scenarios for increasing production of certain market basket foods such as cabbage, broccoli, potatoes and winter wheat. These scenarios are within the realm of possibility, yet all have limitations.

## Conclusion

Although the EFSNE project worked with a relatively small market basket, we believe that the information from this research points to a number of useful

lessons. First, we found it instructive to study the entire supply chain. It has not been common practice in food supply-chain studies to feature the economic value added by all parts of the chain; rather, the focus is often on returns to producers. As shown in the EFSNE research, the value added to the region from downstream chain members is significant for many products.

The inclusion of processed foods in the market basket provides a platform for moderating the message to consumers that fresh foods are more important in diets than other forms. Frozen and canned foods are critical season-extenders, especially of foods grown in the higher latitudes of the Northeast (and other similar) regions. In addition, lower income households that have less access to fresh foods could benefit nutritionally from purchasing processed foods. Processed foods also provide more income to regional producers and decrease transportation costs.

Much research is needed to fill in gaps and better understand how the system can more effectively meet food security needs in the Northeast. Interdisciplinary research at a regional level can offer a range of benefits to researchers, policymakers, and natural resource managers; it needs much more attention (Ericksen, Ingram, & Liverman, 2010). Appropriate research approaches must be capable of capturing the interlinked relationships that compose the food system (Ericksen et al., 2010).

Inter- and trans-disciplinary research is an important way to understand the complexity, contradictions, and the complementarities of food systems, but there are few integrated examples in the US (see IOM-NRC 2015). We have started to operationalize this integration in EFSNE by employing a market basket framework among other research instruments. We believe that we have helped lay the groundwork for a better understanding of food systems in general, and the Northeast food system in particular, related to scale, supply chains, biodiversity, resiliency, and other elements critical to long-term food security. ❖

## About the EFSNE project

The work described here is part of a larger research project called “Enhancing Food Security in the Northeast through Regional Food Systems” (EFSNE). From 2011 to 2017, the EFSNE project engaged more than 40 partners at multiple universities, non-profits and government agencies around the question of whether greater reliance on regionally produced food could improve food access in low-income communities, while also benefiting farmers, food supply chain firms and others in the food system. Learn more at <http://agsci.psu.edu/research/food-security>.

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